Bean Tunnel

Biodiversity Net Gain Assessment

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Biodiversity Net Gain Assessment

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This report dated 18 June 2024 has been prepared for Kent County Council (the "Client") in accordance with the terms and conditions of appointment dated 21 September 2023 (the "Appointment") between the Client and **Arcadis Consulting (UK) Limited** ("Arcadis") for the purposes specified in the Appointment. For avoidance of doubt, no other person(s) may use or rely upon this report or its contents, and Arcadis accepts no responsibility for any such use or reliance thereon by any other third party.

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1 EXECUTIVE SUMMARY

Arcadis Consulting (UK) Limited was commissioned by Kent County Council to conduct a Biodiversity Net Gain Assessment of the site for the proposed development at Bluewater, Kent, and the adjacent Eastern Quarry site. The proposed development includes the construction of a new tunnel through the chalk spine under the B255 Bean Road between Bluewater Shopping Centre and the Eastern Quarry site, serving to directly connect the shopping centre to the new Eastern Quarry development and Ebbsfleet International Railway Station.

A preliminary ecological appraisal (PEA) was undertaken by Arcadis in 2023 to value habitats in relation to their condition (Report reference: 10044832-ARC-00-ZZ-SU-EC-0010-01-PEA). Habitats on-site include modified grassland, broadleaved woodland, reedbed, mixed scrub, inland rock, ruderal, individual trees, and developed land. The habitat baseline for areas for proposed off-site habitat creation and enhancement include lake, modified grassland, and bare ground. Using the Statutory Biodiversity Metric at baseline both on-site and off-site equates to 4.94 habitat biodiversity units.

Mitigation for affected habitats, including the habitat of principal importance reedbed, across the site will be addressed by ensuring that an overall net-gain (minimum 10%+) in biodiversity units is achieved, and trading rules for the loss of high distinctiveness habitat are satisfied. The onsite strategy to achieve BNG primarily focusses on reedbed creation, scrub enhancement, tree planting, and grassland creation. The off-site strategy is based around the creation of reedbed, grassland enhancement and scrub creation within Bluewater site which is designated as a Dartford Biodiversity Opportunity Area and supports biodiversity targets within The Dartford Plan.

Through habitat retention, creation and enhancement within the site and off-site, a total net change of 14.48% habitat units has been achieved. Onsite net change will result in an onsite net gain of 0.08% compared to baseline, whereas off-site net change will result in 192.30% in habitat units compared to baseline. Trading rules are satisfied for all distinctiveness habitat groups.

This BNG report should be read in conjunction with the Ecological Impact Assessment (EcIA) (10044832-ARC-00-ZZ-RP-EC-0010-01-EcIA).

2 INTRODUCTION

2.1 Overview

Arcadis Consulting (UK) Limited (Arcadis) was commissioned by Kent County Council to undertake a Biodiversity Net Gain (BNG) survey with habitat condition assessment at Bean Tunnel, Kent ('the site'). This was to inform the proposed development which includes the construction of a new tunnel through the chalk spine beneath the B255 Bean Road between Bluewater Shopping Centre and the Eastern Quarry site. This will directly connect the shopping centre to the new Eastern Quarry development and Ebbsfleet International Railway Station.

This BNG Assessment report provides a description of habitats on-site and proposed post-construction habitats. The BNG calculations were undertaken using the Statutory Biodiversity Metric (BM) issued by DEFRA (DEFRA, 2024a).

Only habitats within the redline planning application boundary, and areas for off-site habitat creation and enhancement have been assessed.

1.1 BNG in Policy and Legislation

Schedule 7A of the Town and Country Planning Act 1990 (as inserted by Schedule 14 of the Environment Act 2021 (HMSO, 2024) introduces a mandatory requirement for 10% biodiversity net gain for new developments. In February 2024 biodiversity net gain became mandatory, meaning that most planning applications, with some exemptions, must deliver biodiversity net gain. This is to ensure that the proposed development contributes to local and national nature recovery.

By achieving a post development net gain the proposals will be able to meet national and local policies and legislation.

3 METHODOLOGY

The BNG calculations in this document were undertaken using the statutory biodiversity metric calculation tool (DEFRA, 2024a), a spreadsheet-based tool into which data can be entered to carry out BNG calculations (DEFRA, 2024b).

Data is entered into the metric using the metric typologies. The statutory biodiversity metric (DEFRA, 2024a) assesses area-based habitats (woodland, grassland etc.) and linear features (hedgerows and rivers) separately, but through broadly the same methodology. As such, the following sections are of relevance to all habitat types.

3.1 Field Survey

An initial survey to support BNG was undertaken in 2023 on 17 and 18 October by Arcadis Senior Ecologist Sam Kendray MCIEEM. The habitats within the planning boundary were mapped and classified according to their metric habitat type, along with the condition of all habitats present within the site according to the Biodiversity Metric 4.0 Guidelines (Natural England, 2023). The habitat condition assessments were updated in May 2024 to meet the current Statutory BM (DEFRA, 2024b) which was published on 29 November 2023.

A follow up survey was undertaken on 21 May 2024 by Arcadis Senior Ecologist Joel Cronin MCIEEM to capture the habitat condition of areas proposed for habitat creation and enhancement within Bluewater Shopping and Retail Destination hereafter referred to as' Bluewater'. The site visit included a walkover with Claire Forest (Mitie Group plc. Environmental and Sustainability Manager for Bluewater) to discuss potential areas for off-site habitat enhancement and creation.

3.2 Metric Calculation

3.2.1 Unit calculation

To calculate the biodiversity units for the site, the value of each habitat parcel is calculated and then multiplied by the size of the parcel. The value is based upon the parcel's distinctiveness (habitat type), condition, and strategic significance. For non-linear habitats, such as woodland or grassland, the area of the habitat is used to assess its size, whereas length is used for linear habitats, such as hedgerows and rivers. The biodiversity unit totals for area-based habitats, hedgerows, and watercourses are separate and cannot be summed. As such they should be evaluated separately. Area based habitats and linear features are largely assessed in the same way and any differences are highlighted below.

This section describes how this proxy unit for biodiversity has been calculated for the existing 'before' (baseline) habitats and the proposed 'after' (post-intervention) habitats. Full details of the statutory biodiversity metric can be found in the User Guide (DEFRA, 2024b).

3.2.2 Habitat size

The size of each habitat parcel was calculated using GIS software, based on the baseline habitat mapping data collected during the site survey. After considering the feasibility of interventions for biodiversity unit enhancements, post-intervention habitat size would be calculated.

3.2.3 Habitat distinctiveness

The metric assigns a pre-defined distinctiveness band to each of the habitats and linear features. As detailed in the User Guide (DEFRA, 2024b). this assessment is based upon "species richness, rarity (at local, regional,

national and international scales), and the degree to which a habitat supports species rarely found in other habitats". Table 1 provides detail of the bandings to which each area-based habitat is assigned.

Table 1 Area based habitat distinctiveness valuation bandings.

Distinctiveness band	Multiplier	Typical habitats
Very High	8	Priority habitats as defined in Section 41 of the Natural Environment and Rural Communities (NERC) Act (HMSO, 2006) that are highly threatened, internationally scarce and require conservation action e.g. blanket bog Small amount of remaining habitat with a high proportion unprotected by designation. Endangered or Critical European red list habitats.
High	6	Priority habitats as defined in Section 41 of the NERC Act (HMSO, 2006) requiring conservation action e.g., lowland fens Remaining Priority Habitats not in very high distinctiveness band & other red list habitats.
Medium	4	Semi-natural habitats not classed as a Priority Habitat but with significant wildlife benefit, e.g., mixed scrub. One Priority Habitat (arable field margins).
Low	2	Habitat of low biodiversity value e.g., temporary grass and clover ley. Agricultural and Urban land of lower biodiversity value.
Very low	0	Little or no biodiversity value e.g., hard standing or sealed surface Urban – artificial structures which are un-vegetated, sealed surfaces or built linear features of very low biodiversity value.

3.2.4 Habitat condition assessment

The condition of the habitat is defined as "a measure of the habitat against its ecological optimum state". Condition is a way of measuring variation in the quality of patches of the same habitat type" (DEFRA, 2024b).This provides a measure of variation in the quality of areas of the same habitat type.

A habitat condition assessment sheet is provided for each habitat type within the User Guide (DEFRA, 2024b). Each condition sheet is composed of a list of pass/fail criteria (woodland is calculated on numerical value as opposed to pass/fail). The ratio of 'passes' to 'fails' is used to determine the habitat condition.

3.2.5 Strategic significance assessment

Strategic significance assesses the value of habitats from the point of view of environmental objectives and preferred locations for biodiversity. Local and national policy was reviewed to quantify the strategic significance of each habitat area. Table 2 and Table 3 were used to assist with this assessment.

Strategic significance assesses the value of habitats from the point of view of environmental objectives and preferred locations for biodiversity. Local and national policy was reviewed to quantify the strategic significance of each habitat area. Strategic significance categories and multipliers are shown in Table 2 and Table 3, based upon Table 7 and 8 in the User Guide (DEFRA, 2024b).

Table 2: - Strategic significance categories and multipliers where Local Nature Recovery Strategy (LNRS) has been published.

Category	Description	Multiplier
High	Where the location has been identified within a LNRS, or an area where a potential measure has been proposed to help deliver the priorities of the LNRS.	1.15
Medium	This category cannot be applied.	1.1
Low	Where the definitions for high strategic significance are not met.	1

Table 3: - Strategic significance categories where LNRS has not yet been published.

Category	Description	Multiplier
High	The habitat is identified as locally ecologically important within a specific location within documents specified by the relevant planning authority.	1.15
Medium	This category can be applied where the Local Planning Authority (LPA) has not identified a suitable document for assessing strategic significance.	1.1
Low	Where definitions for high and medium strategic significance are not met.	1

3.2.6 Post-intervention calculations

The site was reassessed for the conditions that will be present after the intervention actions are implemented. Details of the post-intervention habitat typologies are outlined in the associated BNG calculator. The number of biodiversity units provided by each habitat within the site is calculated in the same way as the baseline habitats, but with the additional multipliers detailed in Table 4.

Table 4: - Risk components included in post-intervention calculations

Risk Factor	Description
Difficulty of creating or restoring a habitat	A standard score based on how difficult the habitat type is to create
Temporal risk	A standard score based on how long the habitat type takes to establish.
Spatial Risk	A standard score based on whether the location of creation/enhancement of habitat is within the neighbouring or outside of the local planning authority / national character area of the proposed development site

3.2.6.1 Difficulty of creating or restoring a habitat

The 'risk' relates to difficulty of the habitat restoration or recreation. There are four bands from Low difficulty to Very High difficulty, with the value multiplier shown below in Table 5.

Table 5: - Risk components included in post-intervention calculations

Category	Multiplier
Very High	0.1
High	0.33
Medium	0.67
Low	1

Different habitat change scenarios are attributed different levels of risk (risk around the confidence in the successful establishment of habitats) and different multipliers are applied to reflect this. Two distinct habitat change scenarios are recognised in the statutory biodiversity metric (DEFRA, 2024a).

Habitat Creation: where one habitat is replaced by another, or the habitat is destroyed (e.g., by proposed development works) and the same habitat is recreated. An example of habitat creation is planting young native trees and scrub on an area of arable land to create a new broadleaved woodland.

Habitat Enhancement: enhancing habitat is where improvements in its distinctiveness and / or condition are made. Examples of restoration are the transformation of an abandoned calcareous grassland dominated by scrub and course grasses to a continuous area of calcareous grassland with isolated woody species and an abundance of fine-leaved grasses or taking measures to remove mooring impacts from a seagrass bed.

3.2.6.2 Temporal risk

Temporal risk is a factor of the time it takes for the habitat to reach target condition. This can be reliant on soil nutrient status, soil type and pH, site preparation, climate and the neighbouring habitats and species available to colonise the new or restored habitat. The timeframe is also resource dependant. With sufficient time and resources most habitats can be recreated more rapidly, but a more gradual process may be more beneficial to wildlife in the longer term.

For purposes of the statutory biodiversity metric (DEFRA, 2024a) average time estimates are used, accepting that there will be variation from this proxy estimate. For example, some sites will take longer, where conditions are more nutrient enriched or higher altitude or north facing. Average estimates of the time to target condition were largely expert driven and build upon the considerations that shaped judgements of the difficulty to create or restore habitat. They were additionally informed by field experience, industry case studies and a body of practical experience. The time to target condition varies between 0 years and greater than 30 years, with 0 years having a multiplier of 1. The multiplier decreases by 3.5% per year.

3.2.6.3 Spatial risk

A separate risk multiplier is applied to post-intervention sites outside of the site. This incentivises the utilisation of sites near the site, for ecological and social reasons. Sites within the same local planning authority area (LPA) or National Character Area (NCA), are deemed sufficiently close to address ecological and social concerns. The LPA would need to provide agreement for any offset at a distance from the site higher multipliers are assigned to more distant sites, as shown in Table 6, which results in a decrease in the value of an off-site location with increasing distance.

Table 6 - Off-site risk categories (LPA - Local Planning Authority area, NCA - National Character Area

Category	Multiplier
Compensation inside LPA or NCA of impact site	1
Compensation outside LPA or NCA of impact site but in neighbouring LPA or NCA	0.75
Compensation outside LPA or NCA if impact site and beyond neighbouring LPA or NCA	0.5

3.2.7 Calculations of gains or losses

The net change in habitat/hedgerow/watercourse biodiversity units on and off-site is calculated within the tool by subtracting the baseline units from the post-intervention units. The overall net change is the sum of the change in units onsite and off-site. The percentage net gain is then calculated by dividing this overall net change by the number of baseline units on the site, as shown in the equation below.

$$overall\ percentage\ net\ gain = \frac{change\ in\ units\ on\ site + change\ in\ units\ off\ site}{baseline\ units\ on\ site} \times 100$$

A positive value indicates a net gain has been made and a negative value indicates a net loss has been made.

3.2.8 Changes in broad habitat type calculations

The UK habitat classification system used within the metric contains a tiered system, grouping similar habitats into “Broad habitats” and more specific “Habitat types”. For example, “Grassland” is a “Broad habitat” that can contain “Modified Grassland” and “Other neutral grassland”, among others. The changes in area and biodiversity units associated with each of these broad habitat types was calculated using the baseline and post-intervention data.

3.2.9 Areas excluded from the assessment

The metric is not designed to assess impacts to habitats within statutory designated sites or “irreplaceable” habitats, was defined in the User Guide (DEFRA, 2024b). There were no irreplaceable habitats, such as ancient woodland, or statutory designated sites present within the site, therefore all habitats were assessed. No hedgerows, rivers or ditches were present within or adjacent to the site boundary, so the hedgerow and river assessment sections of the metric were not required to this assessment.

3.3 Limitations

The initial field survey was completed in October, which was outside the main flowering season. However, given the managed nature of the site and the type of habitats present, it is considered that the survey, alongside the desk study, are sufficient to inform the presence/absence of protected or notable species on-site and is sufficient for characterising the habitats present.

Both field surveys were undertaken using the BM 4.0 Guidelines (Natural England , 2023) and condition assessments were updated following the release of the Statutory BM in November 2023 (DEFRA, 2024b).

The assessment content throughout this report relies upon the assumption that the previously accepted post-construction landscape plan will not be dissimilar from any future proposal for landscaping on-site. The plan can be found in Appendix E.

4 RESULTS

4.1 Onsite and Off-site Baseline Habitats

Error! Reference source not found. provides habitat condition assessments detailing the criteria of the habitats within the site and their conditions. Appendix B contains Drawings showing baseline habitats on-site. Appendix C contains Drawings showing post-construction habitats on-site. Appendix D details post-construction habitats off-site. Appendix E details the previously accepted post-construction landscape plan. 0 details proposed planting mixes.

4.1.1 Onsite - Area Based Habitats

4.1.1.1 Grassland – Modified Grassland (Area 1)

The western side of the site supported mown grassland verges with common species including Perennial Ryegrass (*Lolium perenne*), Fescue (*Festuca sp.*), Yorkshire-fog (*Holcus lanatus*), Common Mouse-ear (*Ceratium fontanum*), Common Dandelion (*Taraxacum officinale*) and Ribwort Plantain (*Plantago lanceolata*) (Area 1, 0.14 ha, Appendix B).

These areas of grassland were assessed as being in 'Poor' condition as they were regularly mown and supported low species diversity.

4.1.1.2 Woodland – Other woodland; broadleaved (Area 2 and 3)

The site supported areas of broadleaved woodland within the western side at the base of a cliff (Area 2, 0.05 ha, Appendix B), this contained Hazel (*Corylus avellana*) coppice stands, Alder, Willow (*Salix sp.*), Field Maple (*Acer campestre*) and Sycamore (*Acer pseudoplatanus*) trees. The understorey supported a mixture of Butterfly-bush (*Buddleja davidii.*), Dogwood (*Cornus sanguinea)* and Dogrose (*Rosa canina* agg.) shrubs, with areas of dense Bramble (*Rubus fruticosus* agg.) scrub in the south. The ground was largely bare (devoid of ground flora species) covered by leaf litter with frequent Dogwood suckers adjacent to the mixed scrub habitat.

The site supported a small parcel of broadleaved woodland to the north of the western side (Area 3, 0.01 ha, Appendix B). This young plantation woodland supported Field Maple and young Oak (*Quercus sp*.) trees with occasional Hazel coppice stands. The understorey was a mixture of Wild Privet (*Ligustrum vulgare*) and Dogwood scrub. The ground was largely devoid of ground flora species, covered by leaf litter with frequent Dogwood suckers adjacent to the mixed scrub habitat.

These areas were species poor, lacked structural diversity and were assessed as being in 'Poor' condition.

4.1.1.3 Wetland – Reedbeds (Area 4)

The western side of the site contained reedbeds (Area 4, 0.07 ha, Appendix B) which were dominated by Common Reed (*Phragmites australis*), other species present included Reed Canary-grass (*Phalaris arundinacea*), Bulrush (*Typha sp.*) and Pendulous Sedge (*Carex pendula*). These reedbeds were part of the original development in 1996-1998 and designed to provide final treatment for surface water from paved areas.

This area was assessed as being in 'Moderate' condition as the habitat supported a diverse structure comprising indicator species for this wetland habitat type and lacked invasive plant species.

4.1.1.4 Heathland and Shrub – Mixed Scrub (Area 5)

Most of the western site supported areas of dense mixed scrub (Area 5, 0.15 ha, Appendix B) comprising, Dogwood, Hawthorn (*Crataegus monogyna*), Bramble, Willow saplings and Dogrose. A small area of Cotoneaster (*Cotoneaster sp.*) was recorded on the western side of the site.

Around the building within the north, the scrub was dominated by Dogwood that was cut to approximately 1 m in height.

This habitat was assessed as being in 'Poor' condition as it lacked age structure and Cotoneaster (a non-native invasive species) was present.

4.1.1.5 Sparsely Vegetated Land – Other inland rock and scree (Area 6, and Area 7)

The site supported chalk cliffs on either side of the minor road, the B255 (Area 6, 0.1 ha, Area 7 0.1 ha, Appendix B); these cliffs supported scattered scrub and ruderal vegetation including Hawthorn, Bramble and Butterfly-bush. To accurately record the area of cliff face impacted it was measured using Google Earth (Google Earth, n.d.) which has 3D modelling of the site allowing for areas to be calculated by taking into account the height of the cliffs to avoid under calculation of the areas from using 2D satellite imagery alone. Taking account for vertical area, total cliff area was 0.2 ha; whereas from a 2D perspective the habitat area measured only 0.07ha.

These areas were assessed to be in 'Moderate' condition.

4.1.1.6 Sparsely Vegetated Land – Ruderal/ Ephemeral (Area 8)

The eastern side of the site supported an area of tall ruderal vegetation (Area 8, 0.01 ha, Appendix B) which supported Canadian Fleabane (*Erigeron canadensis*), Red Clover (*Trifolium pratense*) and Ribwort Plantain with some Yorkshire-fog and Butterfly-bush.

This area lacked species and structural diversity and was assessed as being 'Poor' condition.

4.1.1.7 Urban – Developed Land; Sealed Surface (Area 9)

The site supported areas of hardstanding comprising sections of road and pavement (Area 9, 0.2 ha, Appendix B). There was a single building within the western side of the site which was a Thames Water building and formed part of the water treatment process on-site.

There is no condition assessment for Developed Land and as a result this habitat typology has a pre-assigned condition of 'N/A'.

4.1.1.8 Individual Trees – Urban Tree

The site supported 23 urban trees with species comprising, Common Lime (*Tilia x europaea),* Oak *(Quercus* sp*.)*, Willow (*Salix sp.*), Crab Apple (*Malus sylvestris*) and Ash (*Fraxinus excelsior*).

All trees were assessed as being in 'Moderate' condition and were small in size as defined by the metric (with a Diameter at Breast Height, DBH, of more than 7.5cm and less than or equal to 30cm).

4.1.2 Off-site – Area Based Habitats

4.1.2.1 Grassland – Modified Grassland (Area 10, 11, 12, 14b)

The off-site grassed areas identified for habitat creation and enhancement are located approximately 900m west of the site, within the western area of Bluewater (Area 10, 0.02 ha; Area 11, 0.006 ha; Area 12, 0.076 ha;

Area 14b, 0.015 ha; Appendix B). These areas supported mown modified grassland supporting the same species as the onsite modified grassland detailed above.

These areas were assessed as being in ‘Poor’ condition as they were regularly mown and consisted low species diversity.

4.1.2.1 Lakes – Ornamental Lake or pond (Area 13)

The lake proposed for habitat creation (Bluewater Reference - Lake 4) is situated within the southern area of the Bluewater, approximately 225m southwest of the site. Most of the lake margins consisted of both colonised reedbed and concrete reedbed that formed part of the original development in 1996-1998 to provide final treatment for surface water from paved areas. The area required for habitat creation was located within the northeastern section of the lake consisted of 0.047 ha.

The area proposed for habitat creation was assessed as being in ‘Poor’ condition.

4.1.2.1 Urban – Bare ground (Area 14a)

A small area of bare ground measuring 0.0012 ha will be utilised for habitat creation. The area is located between the Bluewater Nature Trail path and slip road adjacent to a pedestrian underbridge. As it is currently used by the public, the level of ground disturbance is high and species diversity poor.

The area is proposed for habitat creation was assessed as being in ‘Poor’ condition.

4.2 Onsite and Off-site Post Development Habitats

4.2.1 Onsite - Retained habitats

4.2.1.1 Grassland – Modified Grassland (Area 1)

Approximately 0.08 ha of modified grassland habitat within the northern section of the site will be retained. This patch of modified grassland is part of the existing road verge and is required to be managed for the purpose of road safety and therefore will not be enhanced to improve its condition following construction.

4.2.1.2 Woodland – Other woodland; broadleaved (Area 2, 3)

Approximately 0.04 ha of broadleaved woodland within the western side of the cliff will be retained.

Approximately 0.01 ha of broadleaved woodland located north of the western side of the cliff will be retained.

4.2.1.3 Wetland – Reedbeds (Area 4)

Approximately 0.045 ha of reedbed within the site will be retained.

4.2.1.4 Sparsely Vegetated Land – Other inland rock and scree (Area 6, and Area 7)

To construct the new tunnel portals an area of 0.01 ha will be cut out of each side of the cliff face. This will result in a loss of 0.02 ha in total. A total of 0.18 ha will therefore be retained.

4.2.1.5 Sparsely Vegetated Land – Ruderal/Ephemeral (Area 8)

Approximately 0.003 ha of ruderal/ephemeral habitat will be retained within the eastern section of the site. Most of the area will be used to construct the road leading from the new tunnel towards the Eastern Quarry.

4.2.1.6 Urban – Developed Land; Sealed Surface (Area 9)

The sections comprising of road, pavement and the Thames Water building will be retained in its entirety (Area 9, 0.2 ha, Appendix B).

4.2.1.7 Individual Trees – Urban Tree

Of the total 23 trees on-site, 17 small sized trees in 'Moderate' condition will be removed from the western section of the site, with 6 being retained.

4.2.2 Onsite - Retained and enhanced habitats

4.2.2.1 Heathland and Shrub – Mixed Scrub (Area 5)

Approximately 0.09 ha of mixed scrub within the northern section of the site will be retained and enhanced from its current condition 'Poor' to 'Good' condition.

4.2.3 Onsite - Habitat Creation

Planting mixes and management strategies for each habitat can be found in Appendix F.

4.2.3.1 Grassland – Modified Grassland (Area 1)

Small areas totalling 0.006 ha of modified grassland will be provided on the road verges. These habitats will be managed with a highways and visual function and as a result expected to achieve no more than a 'Poor' condition over time.

4.2.3.2 Grassland – Other neutral grassland (Area 4)

A small area (0.003 ha) between existing reedbed and proposed modified grassland will comprise other neutral grassland. Although this area will be seeded with a wildflower mix suitable for chalky soils, due to its location, and size it is anticipated that the condition will be 'Poor'.

4.2.3.1 Wetland – Reedbeds (Area 5)

An area of reedbed (Area 5, approximately 0.03 ha, Appendix C) will be created to extend the existing reedbeds on-site. This area will be planted with a mix of wetland species similar in composition to existing reedbed i.e., with predominately Common Reed.

The proposed habitat creation area is located directly north of the existing reedbed on-site. The area will be excavated to allow for water retention and its banks supported with gabion baskets. The area currently supports mixed scrub habitat assessed as 'Poor' condition. It is expected that this habitat will be managed in a similar manner to the adjacent reedbed and achieve the condition of 'Moderate' in time.

4.2.3.2 Urban – Developed Land; Sealed Surface (Area 4)

The proposed gabions, FastTrack bus lane, associated pavements and cycle lanes will form the developed land; sealed surface habitat (Area 4 and 5, 0.15 ha, Appendix C).

4.2.3.3 Urban – Introduced shrub (Area 4)

A small area of ornamental shrub planting consisting of 0.0001 ha will be situated at the entrance of the tunnel on the western side of the B255.

4.2.3.4 Individual Trees – Urban Tree

A total of 24 native broadleaved trees will be planted in various locations within the site. These are expected to be small in size (DBH less than or equal to 30cm) and to reach 'Moderate' condition after 30 years (see management recommendations detailed in 0).

4.2.4 Off-site - Retained and Enhanced Habitats

4.2.4.1 Grassland – Modified Grassland (Area 10, 11, 12)

The off-site grassed areas due for habitat enhancement are located approximately 900m west of the site, within the western area of the Bluewater (Area 10, 0.02 ha; Area 11, 0.06 ha; Area 12, 0.0757 ha; Appendix B). All habitats supported mown modified grassland comprising the same species as the onsite modified grassland detailed above.

These areas were assessed as being in 'Poor' condition as they were regularly mown and had less than six species per m^2. It is anticipated that these areas will be seeded and managed with the aim of improving the condition from 'Poor' to 'Moderate'. This could be achieved by seeding with a native wildflower seed mix suitable for chalky soils such as the Emorsgate mix 'EM6F Wild Flowers for Chalk & Limestone Soils' (wildseed.co.uk) or similar. Yellow Rattle (*Rhinanthus minor*) should be added at 1 g/m^2 to improve results and reduce the abundance of existing grasses (. These areas have been identified as suitable locations for grassland enhancement by Arcadis ecologists and the Bluewater Environment team.

4.2.5 Off-site - Habitat Creation

Planting mixes and management strategies for each habitat can be found in Appendix F.

4.2.5.1 Wetlands – Reedbed (Area 13)

As reedbed constitutes a high distinctiveness habitat, a condition of BNG requires the replacement of the same habitat. Due to the loss of reed bed habitat on-site, off-site reedbed habitat creation is required to meet BNG trading rules. Approximately 0.047 ha of reedbed will be created off-site within Lake 4 towards the south of the Bluewater site.

The off-site area (Lake 4) proposed for habitat creation was assessed as being in 'Poor' condition. It is anticipated that with appropriate reedbed creation and management the habitat will reach a condition of 'Moderate'.

4.2.5.1 Heathland and shrub – Mixed scrub (Area 14)

Two small areas within Area 14 will be used for scrub creation (Area 14a, 0.0012 ha; Area 14b, 0.015 ha). Area 14a consists of bare ground, at the toe of a slope that leads up to a busy road. Area 14b consists of poor condition modified grassland supporting the same species as the onsite modified grassland detailed above. Providing scrub in this location aims to deter public from accessing the slope, as well as providing habitat for wildlife. Both areas proposed for habitat creation were assessed as being in 'Poor' condition for modified grassland and is anticipated to reach a condition of 'Moderate' quality for scrub when planted and managed for scrub habitat.

4.2.5.2 Individual Trees – Urban Tree

Ten native broadleaved trees will be planted within Area 12, located on the west side of Bluewater. These are expected to be small in size (DBH ≤30cm) and to reach 'Moderate' condition after 30 years..

4.3 Strategic Significance

The majority of the site, excluding the cliff faces, is designated as a 'Biodiversity Opportunity Area' within the Dartford Local Plan (Dartford Borough Council, 2024) and the Kent Nature Partnership Biodiversity Strategy 2020 – 2045 (Kent Nature Partnership, 2020). Bluewater has been designated as a Biodiversity Opportunity Area on the basis that the area has good potential for biodiversity improvement and for connecting nature conservation sites, habitats, and species.

All created and enhanced habitats will be provided within a Biodiversity Opportunity Area and are considered to have high strategic significance due to the opportunity to make positive changes for biodiversity. These habitats have been identified as 'Formally identified in local strategy' within the BNG metric.

The existing reedbed on-site is not included within the main targets for the Kent Nature Partnership Biodiversity Strategy (Kent Nature Partnership, 2020) which aims to improve certain 'priority' habitats and species. Although it is a habitat of principal importance that is found in important wetlands in Kent, the strategic significance for its location within Bluewater is not considered part of the local strategy. As such, the existing reedbed habitat is considered 'location ecologically desirable but not in local strategy' within the BNG metric.

Other inland rock and scree forms the habitat which make up both cliff faces within the site. Although other chalk cliffs within the county are designated (e.g., Swanscombe Peninsula Site of Special Scientific Interest (SSSI), the chalk cliff faces within the site are not part of the local strategy for ecological enhancement. Therefore, this habitat type is also considered 'location ecologically desirable but not in local strategy' within the BNG metric.

4.4 Changes to Broad Habitat Types

The proposed development will result in changes to the habitats on the site. The area and biodiversity unit changes in these broad habitat types are shown in Table 7.

Across onsite and off-site, the habitat units for grassland, wetland, heathland and shrub will increase compared to baseline, with the remaining typologies seeing a decrease in units as a result of the proposed development. In terms of habitat area across onsite and off-site habitats, urban, wetland and individual trees will increase compared to baseline, with the remaining typologies seeing a decrease in area as a result of the proposed development.

Table 7: Combined onsite and off-site change by broad habitat type in the total areas and biodiversity units of broad habitat types

	Combined Baseline		Onsite and Off-site Post-development on-Site		Combined Change	
Habitat group	Combined existing area (ha)	Combined existing value (units)	Combined proposed area (ha)	Combined proposed value (units)	Combined area change (ha)	Combined unit change
Grassland	0.26	0.54	0.19	0.60	-0.07	0.05
Heathland and shrub	0.15	0.60	0.11	1.15	-0.04	0.54
Lakes	0.05	0.11	0.00	0.00	-0.05	-0.11
Sparsely vegetated land	0.21	1.78	0.18	1.59	-0.03	-0.19
Urban	0.20	0.00	0.35	0.00	0.15	0.00
Wetland	0.07	0.92	0.12	1.15	0.05	0.23
Woodland and forest	0.06	0.26	0.05	0.21	-0.01	-0.05
Individual trees	0.09	0.72	0.19	0.91	0.10	0.19

4.5 Trading Rules

A summary of the trading rules within the Statutory Biodiversity Metric calculation are presented in Image 1 below. Under the current plans the trading rules have been met for High, Medium, and Low distinctiveness habitat groups.

Image 1: Summary of Trading Rules within Statutory Biodiversity Metric

Trading Summary		
Distinctiveness Group	Trading Rule	Trading Satisfied?
Very High	Same habitat required – bespoke compensation option ⚠	Yes ✓
High	Same habitat required =	Yes ✓
Medium	Same broad habitat or a higher distinctiveness habitat required (≥)	Yes ✓
Low	Same distinctiveness or better habitat required ≥	Yes ✓

4.6 Summary of Results

A summary of the results of the assessment, using the Statutory Biodiversity Metric calculation tool are presented in

Image 2: Headline results from Statutory Biodiversity Metric Tool

2 below. Under the proposals, a 14.48% change in area biodiversity units is predicted.

Image 2: Headline results from Statutory Biodiversity Metric Tool

On-site baseline	*Habitat units*	4.59		
	Hedgerow units	0.00		
	Watercourse units	0.00		
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	4.60		
	Hedgerow units	0.00		
	Watercourse units	0.00		
On-site net change (units & percentage)	*Habitat units*	0.00	0.08%	Un-site net gain is less than target set ⚠
	Hedgerow units	0.00	0.00%	
	Watercourse units	0.00	0.00%	
Off-site baseline	*Habitat units*	0.34		
	Hedgerow units	0.00		
	Watercourse units	0.00		
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	1.01		
	Hedgerow units	0.00		
	Watercourse units	0.00		
Off-site net change (units & percentage)	*Habitat units*	0.66	192.30%	
	Hedgerow units	0.00	0.00%	
	Watercourse units	0.00	0.00%	
Combined net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	0.67		
	Hedgerow units	0.00		
	Watercourse units	0.00		
Spatial risk multiplier (SRM) deductions	*Habitat units*	0.00		
	Hedgerow units	0.00		
	Watercourse units	0.00		
FINAL RESULTS				
Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	0.67		
	Hedgerow units	0.00		
	Watercourse units	0.00		
Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	14.48%		
	Hedgerow units	0.00%		
	Watercourse units	0.00%		
Trading rules satisfied?	Yes ✓			

The results contain an 'Attention required' warning relating to onsite net change. This warning is triggered when the difference between onsite baseline units and onsite intervention units do not result in a +10% net gain. Although post-intervention habitat proposals have resulted in no-net loss (+0.08% onsite), the warning is trigged. Due to the limited space available and high distinctiveness habitats within the site, it was not possible

to deliver the net gain onsite. When the off-site habitat creation and enhancement is taken account of the proposed development will lead to a total net change resulted in a gain of over 10% and achieve BNG.

5 CONCLUSION

Following construction, the onsite area within the existing reedbed treatment area will be developed land; sealed surface. Some areas of modified grassland and ruderal vegetation in the northern section of the site will also be converted to developed land; sealed surface. Most of the habitats onsite will be retained and new habitat created including reedbed which will connect to retained reedbed maintaining habitat connectivity.

The off-site areas of poor condition modified grassland will be enhanced to become moderate condition modified grassland over time or used for scrub habitat creation or urban tree planting. An area of bare ground will also be used to create scrub habitat. A small area of Lake 4 will be used to create reedbed.

Overall, this habitat retention, creation and enhancement will provide a 14.48% change in area units which meets with statutory requirements for a minimum +10 % BNG and satisfies the trading rules for High, Medium and Low distinctiveness habitat groups.

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Appendix A

Habitat Condition Assessments

Habitat condition assessment – Modified grassland

Table 8 Habitat Condition Assessment of Modified grassland for both onsite and off-site

Condition Assessment Criteria for modified grassland		Criterion passed (Yes or No)				
		Area 1	**Area 10**	**Area 11**	**Area 12**	**Area 14b**
A	There are 6-8 vascular plant species per m^2 present, including at least 2 forbs (these may include those listed in Footnote 1). **Note - this criterion is essential for achieving Moderate or Good condition.** Where the vascular plant species present are characteristic of medium, high or very high distinctiveness grassland, or there are 9 or more of these characteristic species per m^2 (excluding those listed in Footnote 1), please review the full UKHab description to assess whether the grassland should instead be classified as a higher distinctiveness grassland. Where a grassland is classed as medium, high, or very high distinctiveness, please use the relevant condition sheet.	N	N	N	N	N
B	Sward height is varied (at least 20% of the sward is less than 7 cm and at least 20% is more than 7 cm) creating microclimates which provide opportunities for vertebrates and invertebrates to live and breed.	N	N	N	N	Y
C	Any scrub present accounts for less than 20% of the total grassland area. (Some scattered scrub such as bramble *Rubus fruticosus* agg. may be present). Note - patches of scrub with continuous (more than 90%) cover should be classified as the relevant scrub habitat type.	Y	Y	Y	Y	Y
D	Physical damage is evident in less than 5% of total grassland area. Examples of physical damage include excessive poaching, damage from machinery use or storage, erosion caused by high levels of access, or any other damaging management activities.	N	N	N	N	N
E	Cover of bare ground is between 1% and 10%, including localised areas (for example, a concentration of rabbit warrens)[2].	N	N	N	N	N
F	Cover of bracken *Pteridium aquilinum* is less than 20%.	Y	Y	Y	Y	N
G	There is an absence of invasive non-native plant species[3] (as listed on Schedule 9 of WCA[4]).	Y	Y	Y	Y	Y

Table 9 Condition assessment score for modified grassland

Condition Assessment Result (out of 7 criteria)	Condition Assessment Score	Area 1	Area 10	Area 11	Area 12	Area 14b
Passes 6 or 7 criteria including passing essential criterion A	Good (3)					
Passes 4 or 5 criteria including passing essential criterion A	Moderate (2)					
Passes 3 or fewer criteria; OR Passes 4 - 6 criteria (excluding criterion A)	Poor (1)	✓	✓	✓	✓	✓

Habitat condition assessment – Woodland

Table 10 Habitat Condition Assessment of woodland for both onsite and off-site

Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)	Score per indicator	
					Area 2	Area 3
A	Age distribution of trees	Three age-classes[1] present.	Two age-classes[1] present.	One age-class[1] present.	1	1
B	Wild, domestic and feral herbivore damage	No significant browsing damage evident in woodland.	Evidence of significant browsing pressure is present in less than 40% of whole woodland.	Evidence of significant browsing pressure is present in 40% or more of whole woodland.	3	3
C	Invasive plant species	No invasive species present in woodland.	Rhododendron *Rhododendron ponticum* or cherry laurel *Prunus laurocerasus* not present, and other invasive species <10% cover.	Rhododendron or cherry laurel present, or other invasive species ≥10% cover.	3	3
D	Number of native tree species	Five or more native tree or shrub species found across woodland parcel.	Three to four native tree or shrub species found across woodland parcel.	Two or less native tree or shrub species across woodland parcel.	2	2
E	Cover of native tree and shrub species	>80% of canopy trees and >80% of understory shrubs are native.	50 - 80% of canopy trees and 50 - 80% of understory shrubs are native.	<50% of canopy trees and <50% of understory shrubs are native.	2	3

Indicator		Good (3 points)	Moderate (2 points)	Poor (1 point)	Score per indicator	
					Area 2	Area 3
F	Open space within woodland	10 - 20% of woodland has areas of temporary open space. Unless woodland is <10ha, in which case 0 - 20% temporary open space is permitted.	21 - 40% of woodland has areas of temporary open space.	<10% or >40% of woodland has areas of temporary open space. But if woodland <10ha has <10% temporary open space, please see Good category.	1	1
G	Woodland regeneration	All three classes present in woodland; trees 4 - 7 cm Diameter at Breast Height (DBH), saplings and seedlings or advanced coppice regrowth.	One or two classes only present in woodland.	No classes or coppice regrowth present in woodland.	2	2
H	Tree health	Tree mortality 10% or less, no pests or diseases and no crown dieback.	11% to 25% tree mortality and or crown dieback or low-risk pest or disease present.	Greater than 25% tree mortality and or any high-risk pest or disease present.	3	3
I	Vegetation and ground flora	Recognisable NVC plant community at ground layer present, strongly characterised by ancient woodland flora specialists.	Recognisable woodland NVC plant community at ground layer present.	No recognisable woodland NVC plant community at ground layer present.	1	1
J	Woodland vertical structure	Three or more storeys across all survey plots, or a complex woodland.	Two storeys across all survey plots.	One or less storey across all survey plots.	1	1
K	Veteran trees	Two or more veteran trees per hectare.	One veteran tree per hectare.	No veteran trees present in woodland.	1	1
L	Amount of deadwood	50% of all survey plots within the woodland parcel have deadwood, such as standing and fallen deadwood, large dead branches and or stems, branch stubs and stumps, or an abundance of small cavities.	Between 25% and 50% of all survey plots within the woodland parcel have deadwood, such as standing and fallen deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities.	Less than 25% of all survey plots within the woodland parcel have deadwood, such as standing and fallen deadwood, large dead branches and or stems, stubs and stumps, or an abundance of small cavities.	1	1
M	Woodland disturbance	No nutrient enrichment or damaged ground evident.	Less than 1 hectare in total of nutrient enrichment across woodland area, and or less than 20% of woodland area has damaged ground.	1 hectare or more of nutrient enrichment, and or 20% or more of woodland area has damaged ground.	3	1

Table 11 Condition assessment score for woodland

Condition Assessment Result	Condition Assessment Score	Score	
		Area 2	Area 3
Total score >32 (33 to 39)	Good (3)		
Total score 26 to 32	Moderate (2)		
Total score <26 (13 to 25)	Poor (1)	24	23

Habitat condition assessment – Reedbed

Table 12 Habitat Condition Assessment of reedbed

Condition Assessment Criteria		Criterion passed (Yes or No)
		Area 4
A	The water table is at, or near the surface throughout the year - this could be open water or saturation of soil at the surface. There is no artificial drainage, unless specifically to maintain water levels as specified above. **Note - this criterion is essential for achieving Good condition.**	N
B	The parcel represents a good example of its specific habitat type - the appearance and composition of the vegetation closely matches its UKHab description, with vascular and non-vascular characteristic indicator species consistently present.	Y
C	The water supplies (groundwater, surface water and or rainwater) to the wetland are of good water quality, with clear water (low turbidity) indicating no obvious signs of pollution.	N
D	Cover of scrub and scattered trees are less than 10%.	N
E	Cover of bare ground is less than 5%.	Y
F	There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA) and species indicative of suboptimal condition make up less than 5% of ground cover.	Y
G	No more than 25% of the habitat area has a continuous cover of litter (such as dead vegetation) preventing regeneration.	Y
H	Sphagnum moss *Sphagnum* spp. and cottongrasses *Eriophorum* spp. are at least Frequent[5]. Cover of ericaceous dwarf shrubs is less than 75%.	N/A
I	The reedbed has a diverse structure with between 60% and 80% reeds *Phragmites australis*. Other areas may include open water (at least 10%), species-rich fen and or wet woodland.	Y

Table 13 Condition assessment score for reedbed

Results for habitats requiring assessment of 6 criteria:		Area 4
Passes 5 or 6 core criteria, including criterion A.	Good (3)	
Passes 3 or 4 core criteria; OR Passes 5 core criteria but fails criterion A.	Moderate (2)	5 (Fails criterion A)
Passes 2 or fewer core criteria.	Poor (1)	

Habitat condition assessment – Scrub

Table 14 Habitat condition assessment for scrub

Condition Assessment Criteria		Criterion passed (Yes or No)
		Area 5
A	The parcel represents a good example of its habitat type - the appearance and composition of the vegetation closely matches its UKHab description (where in its natural range). - At least 80% of scrub is native, - There are at least three native woody species, - No single species comprises more than 75% of the cover (except hazel *Corylus avellana*, common juniper *Juniperus communis*, sea buckthorn *Hippophae rhamnoides* (only in its restricted native range), or box *Buxus sempervirens*, which can be up to 100% cover).	Y
B	Seedlings, saplings, young shrubs and mature (or ancient or veteran) shrubs are all present.	N
C	There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA) and species indicative of suboptimal condition[6] make up less than 5% of ground cover.	N
D	The scrub has a well-developed edge with scattered scrub and tall grassland and or forbs present between the scrub and adjacent habitat.	N
E	There are clearings, glades or rides present within the scrub, providing sheltered edges.	Y

Table 15 Condition assessment score for scrub

Condition Assessment Result (out of 5 criteria)	Condition Assessment Score	Score Achieved
		Area 5
Passes 5 criteria	Good (3)	
Passes 3 or 4 criteria	Moderate (2)	
Passes 2 or fewer criteria	Poor (1)	2

Habitat condition assessment – Other inland rock and scree

Table 16 Habitat condition assessment for Other inland rock and scree

Condition Assessment Criteria		Criterion passed (Yes or No)	
		Area 6	Area 7
A	The parcel represents a good example of its specific sparsely vegetated habitat type - the appearance and composition of the vegetation closely matches its UKHab description, with characteristic indicator species consistently present.	Y	Y
B	The cover of bracken *Pteridium aquilinum*, scrub and trees is less than 25%.	N	N
C	There is an absence of invasive non-native plant species (as listed on Schedule 9 of WCA) and species indicative of suboptimal condition[4] make up less than 5% of vegetated ground cover.	Y	Y
D	Vegetation cover of vascular and non-vascular plants is between 5 and 50%.	Y	Y

Table 17 Condition assessment score for other inland rock and scree

Condition Assessment Result (out of 4 criteria)	Condition Assessment Score	Score Achieved	
		Area 6	Area 7
Passes 4 criteria	Good (3)		
Passes 3 criteria	Moderate (2)	3	3
Passes 2 or fewer criteria	Poor (1)		

Habitat condition assessment – Ruderal/ephemeral and bare ground

Table 18 Habitat condition assessment for ruderal/ephemeral and bare ground

Condition Assessment Criteria		Criterion passed (Yes or No)	
		Area 8	**Area 14a**
	Core Criteria - must be assessed for **all urban habitat types**:		
A	Vegetation structure is varied, providing opportunities for vertebrates and invertebrates to live, eat and breed. A single structural habitat component or vegetation type does not account for more than 80% of the total habitat area.	N	N
B	The habitat parcel contains different plant species that are beneficial for wildlife, for example flowering species providing nectar sources for a range of invertebrates at different times of year.	N	N
C	Invasive non-native plant species (listed on Schedule 9 of WCA) and others which are to the detriment of native wildlife (using professional judgement)[2] cover less than 5% of the total vegetated area. **Note - to achieve Good condition, this criterion must be satisfied by a complete absence of invasive non-native species (rather than <5% cover).**	Y	Y

Table 19 condition assessment score for ruderal/ephemeral and bare ground

Condition Assessment Result	Condition Assessment Score	Score Achieved	
		Area 8	**Area 14a**
Results for habitats requiring assessment of **3 core criteria** only **(all listed urban habitats except Open mosaic habitat on previously developed land, Bioswale, SuDS and Green roofs)**:			
• Passes all 3 core criteria; AND • Meets the requirements for Good condition within criterion C.	Good (3)		
• Passes 2 of 3 core criteria; OR • Passes 3 of 3 core criteria but does not meet the requirements for Good condition within criterion C.	Moderate (2)		
• Passes 0 or 1 of 3 core criteria.	Poor (1)	1	**1**

Habitat condition assessment – Urban tree

Table 20 Habitat condition assessment for urban trees

Condition Assessment Criteria		Criterion passed (Yes or No)
A	The tree is a native species (or at least 70% within the block are native species).	Y
B	The tree canopy is predominantly continuous, with gaps in canopy cover making up <10% of total area and no individual gap being >5 m wide (individual trees automatically pass this criterion).	N
C	The tree is mature (or more than 50% within the block are mature).	N
D	There is little or no evidence of an adverse impact on tree health by human activities (such as vandalism, herbicide or detrimental agricultural activity). And there is no current regular pruning regime, so the trees retain >75% of expected canopy for their age range and height.	Y
E	Natural ecological niches for vertebrates and invertebrates are present, such as presence of deadwood, cavities, ivy or loose bark.	N
F	More than 20% of the tree canopy area is oversailing vegetation beneath.	Y

Table 21 Condition assessment score for urban trees

Condition Assessment Result (out of 6 criteria)	Condition Assessment Score	Score Achieved
Passes 5 or 6 criteria	Good (3)	
Passes 3 or 4 criteria	Moderate (2)	3
Passes 2 or fewer criteria	Poor (1)	

Habitat condition assessment – Lakes

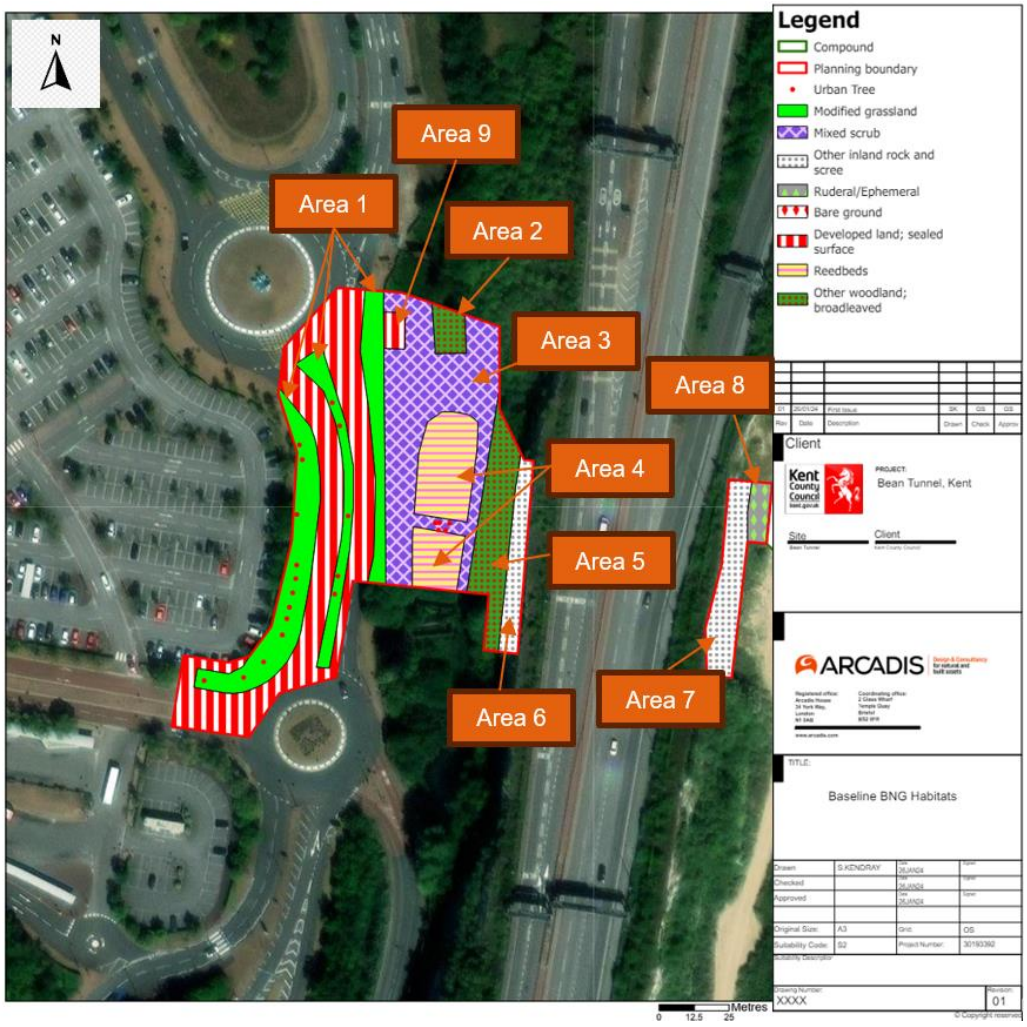
Table 22 Condition assessment score for lakes

Average 'Habitat Naturalness Assessment' Class	Condition Assessment Score	Score Achieved
1 Natural	Good (3)	
2	Fairly good (2.5)	
3	Moderate (2)	
4	Fairly poor (1.5)	
5 Least natural	Poor (1)	✓

There is no condition assessment for Developed Land; Sealed Surface (Area 9).

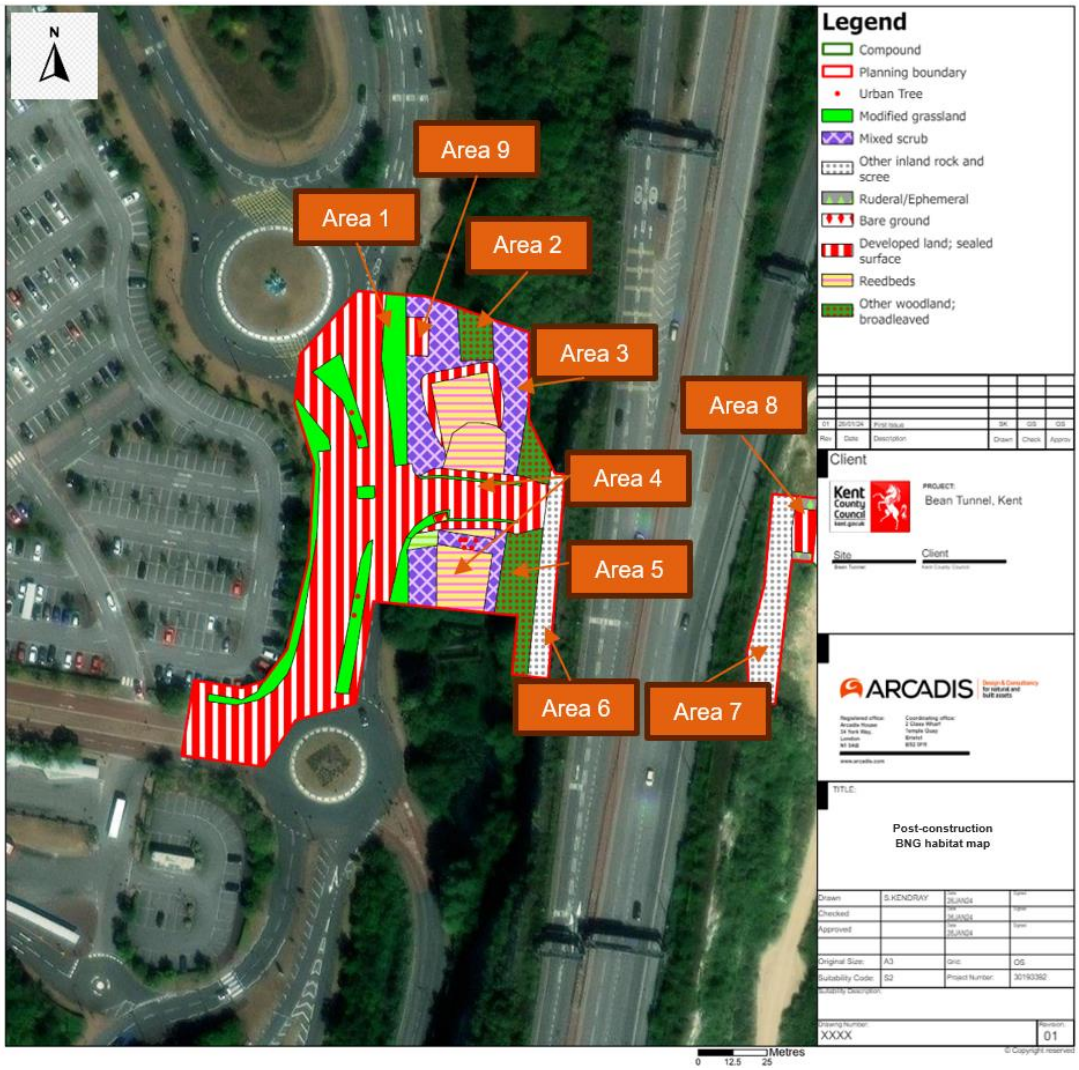
Appendix B

Drawing 1: Baseline Habitats Map



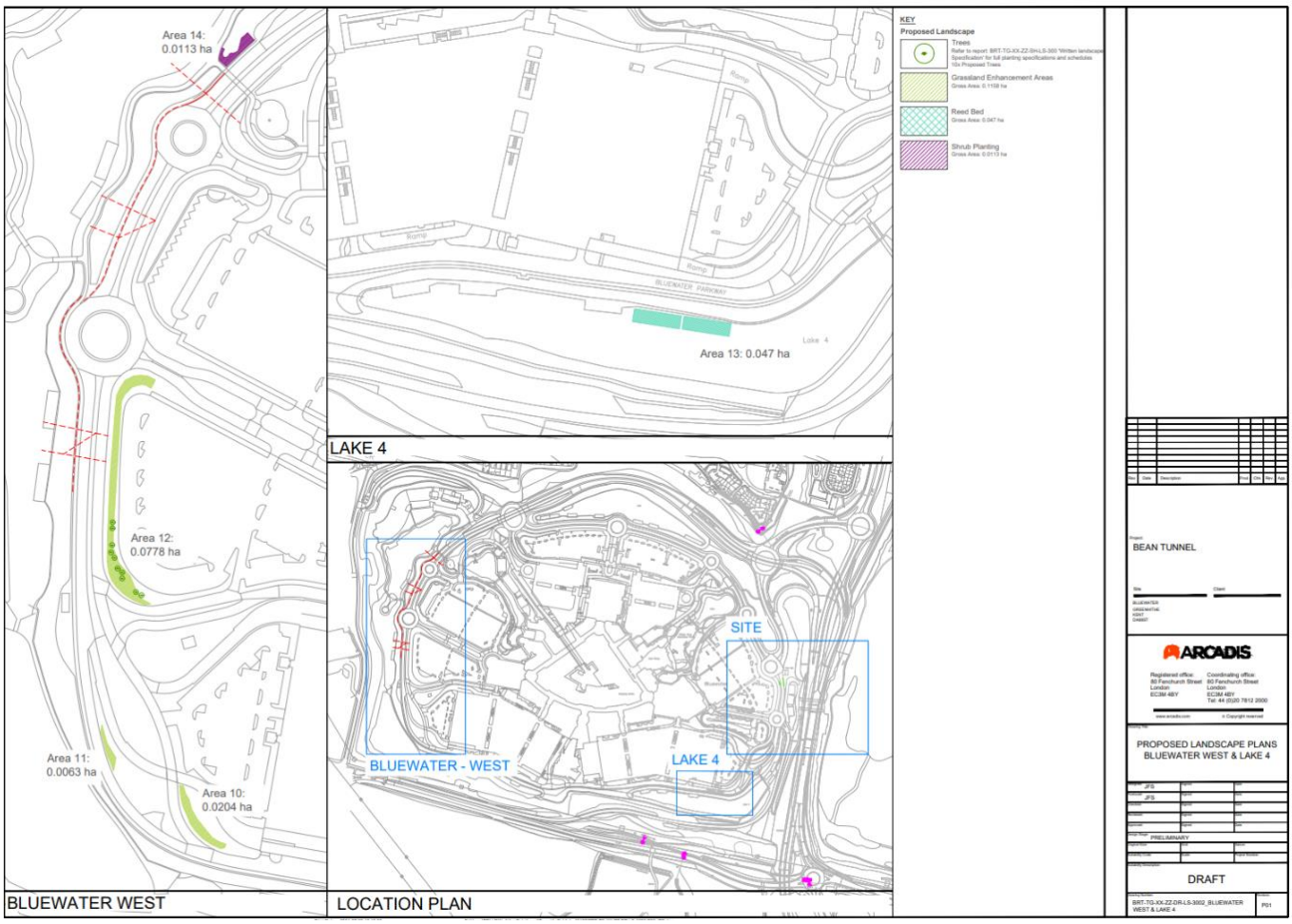
Appendix C

Drawing 2: Post-construction Habitats Plan – On-site



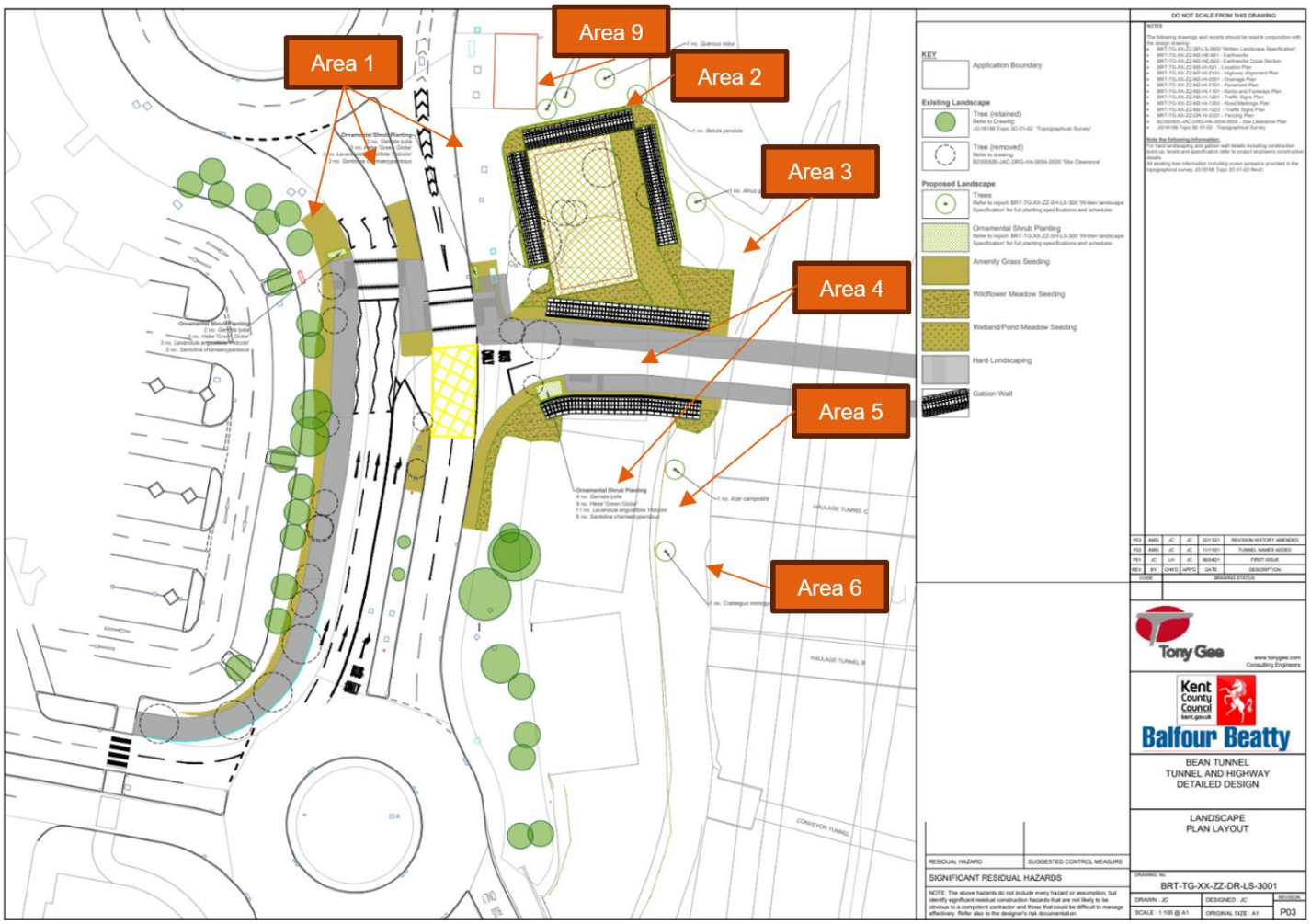
Appendix D

Drawing 3: Post-construction Habitats Plan – Off-site



Appendix E

Drawing 4: Previously accepted Post-construction Landscape Plan



Appendix F

Post-development Habitat Planting Schedules and Management Regimes

Modified Grassland

Enhancement

Areas of modified grassland which could be enhanced to a better condition. This could be achieved by seeding with EM6F Wild Flowers for Chalk & Limestone Soils (wildseed.co.uk) or similar. Yellow Rattle (*Rhinanthus minor*) should be added at 1 g/m^2 to improve results and reduce the abundance of existing grasses.

Table 23: Wildflower mix for Chalk & Limestone Soils

Species	Common Name	% of mix
Wildflowers – 20%		
Achillea millefolium	Yarrow	1.00
Agrimonia eupatoria	Agrimony	0.20
Betonica officinalis	Betony	0.20
Centaurea nigra	Common Knapweed	3.00
Filipendula ulmaria	Meadowsweet	0.60
Galium verum	Lady's Bedstraw	1.50
Geranium pratense	Meadow Crane's-bill	0.20
Lathyrus pratensis	Meadow Vetchling	1.00
Leucanthemum vulgare	Oxeye Daisy	1.60
Lotus corniculatus	Bird's-foot Trefoil	0.30
Malva moschata	Musk Mallow	0.40
Plantago lanceolata	Ribwort Plantain	2.00
Primula veris	Cowslip	0.80
Prunella vulgaris	Selfheal	1.00
Ranunculus acris	Meadow Buttercup	0.80
Rhinanthus minor	Yellow Rattle	3.00
Rumex acetosa	Common Sorrel	0.80
Sanguisorba officinalis	Great Burnet	0.40
Silene flos-cuculi	Ragged Robin	0.20
Vicia cracca	Tufted Vetch	1.00
Grasses – 80%		
Agrostis capillaris	Common Bent	8.00

Anthoxanthum odoratum	Sweet Vernal-grass	2.40
Briza media	Quaking Grass	4.00
Cynosurus cristatus	Crested Dogtail	40.00
Festuca rubra	Red Fescue	20.00
Alopecurus pratensis	Meadow Foxtail	2.80
Schedonorus pratensis	Meadow Fescue	2.80

Table 24: Management strategy for wildflower mix for Chalk & Limestone Soils

Meadow Mixture for EM6F Wild Flowers for Chalk & Limestone Soils or similar	
Sowing rate	4 g/m^2 with additional Yellow Rattle (*Rhinanthus minor*) at 1 g/m^2
Sowing time	September- May
Ground preparation	• Control any perennial weeds such as docks or thistles • Plough or dig to bury the surface vegetation, harrow or rake to produce a medium tilth, and roll, or tread, to produce a firm surface.
Sowing instructions	Seed is best sown in the autumn or spring but can be sown at other times of the year if there is sufficient warmth and moisture. The seed must be surface sown and can be applied by machine or broadcast by hand. To get an even distribution and avoid running out, divide the seed into two or more parts and sow in overlapping sections. Do not incorporate or cover the seed, but firm in with a roll, or by treading, to give good soil/seed contact.
First year management	• With the exception of Yellow Rattle, most of the sown meadow species are perennial and will be slow to germinate, grow and flower, particularly against the competition from established grasses • Cut the annual weeds in mid to late summer, remove and compost. • This will reveal the young meadow, which can then be kept short by grazing or mowing through to the end of March of the following year.
Long-term management	• Meadow grassland is not cut or grazed from spring through to late July/August to give the sown species an opportunity to flower. • After flowering in July or August take a 'hay cut': cut back with a scythe, petrol strimmer or tractor mower to c. 50 mm. Leave the 'hay' to dry and shed seed for 1-7 days then remove from site. • Mow the re-growth through to late autumn/winter to c. 50 mm and again in spring if needed.

Mixed Scrub

Creation

The following native scrub species or similar could be planted to create Hawthorn dominated scrub (not over 75% Hawthorn) in 'Moderate' condition.

Table 25: Planting mix for native mixed scrub

Species	Common Name	% mix
Crataegus monogyna	Hawthorn	60
Cornus sanguinea	Dogwood	10
Euonymus europaeus	Spindle	10
Rosa canina	Dog-rose	10
Prunus spinosa	Blackthorn	10

The following management measures should be undertaken every five years to ensure the habitat reaches 'Moderate' condition:

- Thin out shrubs to maintain shape and create small clearings to improve structural diversity;
- Prune to ensure scrub height does not exceed 5 m;
- Removal of invasive or non-native species; and
- Manage Hawthorn to ensure that it is dominant but does not account for more than 75 % of the cover.

Reedbed

Creation

The following native species should be planted to create reedbed in 'Moderate' condition.

Table 26: Planting mix for reedbed

Species	Common Name	% mix
Phragmites australis	Common reed	100

The following management measures should be undertaken every five years to ensure the habitat reaches 'Moderate' condition:

- Other reeds may naturally occur within the created patches of reedbed. If so ensure between 60% and 80% of the reeds are *Phragmites australis;*
- Remove shrub and trees so reedbed dominates the composition by more than 90%;
- Plug plant additional reedbed in areas void of reed so that reedbed covers an area of at least 95%; and,
- Removal of invasive or non-native species

Urban Trees

Creation

Post-development Habitat Planting Schedules and Management Regimes

The following native broadleaved tree species will be planted and have been selected as they are tolerant to waterlogging and the shallow water table on the site.

Table 27: Planting mix for urban trees

Species	Common Name
Alnus glutinosa	Alder
Salix alba	White Willow
Betula pendula	Silver Birch
Salix caprea	Goat Willow

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